

In the Specification

Column 5, line 10, after "932,014" insert --(now U.S. Patent No. 4,755,741)--.

In the Claims

Please cancel claim 83 without prejudice.

Please amend claims 82, 86-87 and 89-91 as follows:

82. (Amended) An integrated circuit for implementing a current-mode switching voltage regulator circuit by connecting the integrated circuit to external components, the integrated circuit comprising:

at most five terminals, the terminals comprising input and ground terminals for connecting the integrated circuit to a source of input voltage and current, an output terminal for connecting the integrated circuit to an external inductive or transformer load, a feedback terminal for receiving an external feedback signal proportional to the regulated output voltage of the switching regulator, and a compensation terminal for connection to an external frequency compensation network;

a power switching transistor having its collector-emitter circuit coupled to conduct a current between the output terminal and the ground terminal;

means coupled to the switching transistor for varying the on and off duty cycle of the switching transistor in response to a control signal;

means including a resistive element coupled in series with the collector-emitter circuit of the switching transistor, and an amplifier coupled to the resistive element for generating a current sense signal indicative of the current conducted by the switching transistor;

means for generating an error signal indicative of a difference between the feedback signal and a reference signal;

means for coupling the error signal to the compensation terminal; and

means for comparing the current sense signal to the error signal and for generating the control signal to turn off the switching transistor when the current sense signal compares in a predetermined manner to the error signal to vary the duty cycle of the switching transistor to produce the regulated output voltage.

86. (Amended) An integrated circuit for implementing a current-mode switching voltage regulator circuit by connecting the integrated circuit to external components, the integrated circuit comprising:

at least an input terminal and a ground terminal for connecting the integrated circuit to a source of input voltage and current, an ³output terminal for connecting the integrated circuit to an external inductive or transformer load, a feedback terminal for receiving an external feedback signal proportional to the regulated output voltage of the switching regulator, and a ⁵compensation terminal for connection to an external frequency compensation network;

a power switching transistor structure coupled to conduct current between the output terminal and the ground terminal;

a driver circuit coupled to provide a base drive current to the switching transistor;

a circuit coupled to the driver circuit for varying the on and off duty cycle of the switching transistor in response to a control signal;

a circuit including a resistive element coupled in series with the current path in the switching transistor between the output terminal and the ground terminal and an amplifier coupled to the resistive element for generating a current sense signal indicative of the current conducted by the switching transistor;

a circuit for generating an error signal indicative of a difference between the feedback signal and a reference signal, and for coupling the error signal to the compensation terminal and to the driver circuit;

a reference circuit coupled to provide the reference signal to the circuit for generating an error signal;

a circuit for comparing the current sense signal to the error signal and for generating the control signal to turn off the switching transistor when the current sense signal compares in a predetermined way to the error signal to vary the duty cycle of the switching transistor to produce the regulated voltage, the comparing circuit further being responsive to control signals externally applied to the compensation terminal for performing at least one of (a) limiting peak current conducted by the switching transistor, and (b) variably limiting current conducted by the switching transistor as a function of time; and

a circuit for placing the integrated circuit into a shutdown state where the current drawn by the integrated circuit is reduced, including by deactivating the reference circuit; wherein:

the driver circuit is responsive at least in part to the error signal for causing the base drive current provided to the switching transistor to vary so as to increase the efficiency of operation of the switching transistor.

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87. (Amended) The integrated circuit of claim 86,
wherein the circuit for placing the integrated circuit into a
shutdown state is responsive to a signal externally applied to
the compensation terminal.

89. (Amended) An integrated circuit for implementing a
current-mode switching regulator circuit by connecting the
integrated circuit to external components, the integrated
circuit comprising:

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at least an input terminal and a ground terminal for
connecting the integrated circuit to a source of input voltage
and current, an output terminal for connecting the integrated
circuit to an external inductive or transformer load, a
feedback terminal for receiving an external feedback signal
proportional to the regulated output voltage of the switching
regulator, and a compensation terminal for connection to an
external frequency compensation network;

a power switching transistor structure coupled to
conduct current between the output terminal and the ground
terminal;

a circuit coupled to the switching transistor
structure for varying the on and off duty cycle of the
switching transistor in response to a control signal;

a circuit, including a resistive element coupled in
series with a current path in the switching transistor
structure between the output terminal and the ground terminal
and an amplifier coupled to the resistive element, for
generating a current sense signal indicative of the current
conducted by the switching transistor;

a circuit for generating an error signal indicative
of a difference between the feedback signal and a reference

signal, and for coupling the error signal to the compensation terminal; and

a circuit for comparing the current sense signal to the error signal and for generating the control signal to turn off the switching transistor when the current sense signal compares in a predetermined way to the error signal to vary the duty cycle of the switching transistor to produce the regulated voltage, said comparing circuit further being responsive to control signals externally applied to the compensation terminal for (a) limiting peak current conducted by the switching transistor and (b) variably limiting current conducted by the switching transistor as a function of time.

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wherein the integrated circuit terminals require connection to no more than five different nodes among the external components to implement a current-mode switching regulator circuit.

90. (Amended) The integrated circuit of claim 89, further comprising a circuit for reducing the current drawn by the integrated circuit to place the integrated circuit into a shutdown state.

91. (Amended) The integrated circuit of claim 90, wherein the circuit for reducing the current drawn by the integrated circuit is responsive to a signal externally applied to the compensation terminal.

REMARKS

Summary of Examiner's Action

Claims 1-92 were pending in this reissue application.

The Examiner has objected to the specification under 35 U.S.C. § 112, first paragraph, for failing to provide